

DRAFT

**Strategic Plan
NOAA Office of Oceanic and Atmospheric
Research
FY 2005 – FY 2010**

**United States Department of Commerce
National Oceanic and Atmospheric Administration**

A Message from the Assistant Administrator

--In progress--

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OAR Strategic Plan FY 2005 – FY 2010

I. The Office of Oceanic and Atmospheric Research (OAR)

The NOAA Vision -- An informed society that uses a comprehensive understanding of the role of the oceans, coasts, and atmosphere in the global ecosystem to make the best social and economic decisions

The NOAA Mission -- To understand and predict changes in Earth's environment and conserve and manage coastal and marine resources to meet our Nation's economic, social, and environmental needs.

Meeting the increasing needs of society for useful environmental information and products is one of NOAA's greatest challenges. NOAA seeks to achieve this objective through an integrated approach linking science, service and stewardship. NOAA's Office of Oceanic and Atmospheric Research (OAR) provides the key scientific foundation of this effort.

In a world where changing demographics is causing a rising demand for scarce resources and putting more people in the path of natural hazards, we strive to unlock the mysteries of variability in our oceanic and atmospheric systems at local, regional, and global levels in support the agency's efforts to provide effective service and stewardship to the Nation. This approach recognizes the importance of understanding the earth system in time scales ranging from minutes to decades and even longer when investigating processes associated with climate, weather, water, and ecosystems. We are committed to providing the best available information and products to help decision-makers plan for and respond to environmental challenges now and in the future.

NOAA's science mission is challenging because of the complexity and interrelated character of the natural systems in which we work and live. NOAA scientists seek to explore and generate useful information regarding the complex interactions among our planet's air, water, solar, land, and socio-economic systems. For example, each year we expand our knowledge of the ocean's role in influencing climate patterns; this insight contributes to our ability to understand the role of the dynamic climate system on weather phenomena around the world. The need for unbiased scientific information to support a multitude of decisions about environmental challenges has never been more critical.

NOAA's Strategic Plan demonstrates how the agency's activities touch the lives of every citizen in this country and much of the world. In OAR, we have multiple responsibilities, from weather and climate forecasting to mapping coastal waterways and homeland security support. We strive to understand and describe the environment in support of the broad NOAA mission through a wide array of research and development activities. NOAA/OAR supports the agency's integrated effort through pursuit of the following mission:

**Office of Oceanic and Atmospheric (OAR) Mission --
To conduct environmental research, provide scientific information and research leadership, and transfer research into products and services to meet the evolving economic, social, and environmental needs of NOAA**

We create a balance of near-term responsibility to address the operational and regulatory needs of NOAA and our stakeholders with a long-term commitment to conduct visionary, discovery-based research. This dual responsibility requires transfer of research to operations, as well as continued exploration and discovery in new areas that will expand the boundaries of our understanding of the Earth system and lay the foundation for the NOAA services of the future. We at OAR also recognize that new scientific ideas depend on the vast amount of data collected from observing systems and the management of that data, a cross-cutting priority of NOAA discussed in detail in the NOAA Strategic Plan.

A balanced research program yields benefits to our nation as sound science informs the policy debate around the most pressing issues. The OAR Vision describes our motivation for continuing to strive towards excellence:

**OAR Vision --
A society that uses the results of our research as the scientific basis for more productive and harmonious relationships between humans and the environment.**

OAR is comprised of 12 federal laboratories and their Joint Institute partners, the National Sea Grant College Program (SG), Office Of Ocean Exploration (OE), the Office of Global Programs (OGP), and the National Undersea Research Program (NURP). Figure 1.1 below provides an illustration of the NOAA Programs that our entities support. (See Appendix 1 for acronym list.)

Figure 1.1 OAR Labs and Programs Contributing to NOAA-wide Programs

	Ecosystem Research	Ecosystem Observations	Aquaculture	Habitat	Climate Forcing	Climate Observations	Climate Predict/Assess	Reg'l Decision Support	ST&I	Air Quality	Coasts, Estuaries, and Oceans	Environmental Modeling	Space Weather
AL					●	●	●			●			
ARL		●				●				●			
AOML	●				●	●			●				
CDC						●	●	●					
CMDL					●	●				●			
EPP/MSI	●	●	●	●			●				●	●	
ETL		●			●		●		●	●	●		
FSL						●			●	●		●	
GFDL					●	●	●					●	
GLERL	●					●							
NSSL									●				
PMEL	●	●			●	●			●	●			
SEC						●							●
OGP	●				●	●	●	●					
OE	●												
NURP	●	●											
SG	●		●	●									

Partners and Customers – Domestic and International

Partners provide additional scientific and technical expertise necessary for us to carry our mission. Limited resources and complex problems make partnerships essential to the overall portfolio of research advances. Partnership interactions span a wide range of relationships including formal and informal partnerships with other federal agencies; universities and academia; the private sector; state, local and tribal governments; and the international community.

We are positioned to work with the global research community to deliver effective research and operational products and services to serve our nation. Our International Activities Office is dedicated to developing new environmental tools and capabilities by fostering strategic international partnerships. This office serves as a focal point for NOAA research scientists engaged in international collaborative research, monitoring, and assessments. Working with more than 65 countries around the world, we support cooperative research focused on global-scale environmental issues.

We are also committed to maintaining a strong relationship with the external research community by expending a significant portion of our research funding outside NOAA. OAR supports individual scientists who respond to specific announcements of opportunity and research at Joint and Cooperative Institutes as well as at various

academic and other institutions through SG, OGP, OE, and NURP. Extramural research through long-term institutional partnerships with selected universities and organizations, such as those in NURP and SG, play an important role in enabling us to reach our goals by harnessing the capabilities and flexibility of the external scientific enterprise.

NOAA's Joint and Cooperative Institutes play a vital role in enhancing our current weather and climate prediction capabilities. They also play an essential role in broadening NOAA's ability to provide an expanding array of environmental assessment and predictions and to address regional forecasting needs. The research focus for the Joint Institutes (JI) varies widely and is an important resource for research that NOAA needs to fulfill our mission. Joint and Cooperative Research Institutes serve an additional important function: they educate and train the next generation of NOAA's and the nation's scientific workforce. Some cooperative agreements between NOAA and our academic partners provide for formal NOAA sponsorship of students through fellowships. Table 1.1 lists the OAR laboratories, JI's, and Cooperative Institutes.

Table 1.1 OAR Laboratories and Joint/Cooperative Institutes

Laboratories	Joint/Cooperative Institutes
<i>Office of Oceanic and Atmospheric Research</i>	
Aeronomy Laboratory (AL)	Cooperative Institute for Arctic Research
Air Resources Laboratory (ARL)	Cooperative Institute for Atmospheric Sciences and Terrestrial Applications
Atlantic Oceanographic and Meteorological Laboratory (AOML)	Cooperative Institute for Climate and Ocean Research
Climate Diagnostics Center (CDC)	Cooperative Institute for Climate Applications and Research
Climate Monitoring and Diagnostics Laboratory (CMDL)	Cooperative Institute for Climate Science
Environmental Technology Laboratory (ETL)	Cooperative Institute for Limnology and Ecosystems Research
Forecast Systems Laboratory (FSL)	Cooperative Institute for Marine and Atmospheric Studies
Geophysical Fluid Dynamics Laboratory (GFDL)	Cooperative Institute for Mesoscale Meteorological Studies
Great Lakes Environmental Research Laboratory (GLERL)	Cooperative Institute for Research in Environmental Science
National Severe Storms Laboratory (NSSL)	Cooperative Institute for Research in the Atmosphere
Pacific Marine Environmental Laboratory (PMEL)	Joint Institute for Marine and Atmospheric Research
Space Environment Center (SEC)	Joint Institute for Marine Observations
	Joint Institute for the Study of the Atmosphere and Ocean

Education and Outreach

We are dedicated not only to providing high quality research, but also to ensuring that the next generation of scientists will be highly educated, diverse, and ready to take on the environmental challenges of the new millennium. We support NOAA's cross-cutting priority of promoting environmental literacy, outreach, and education of our future scientists as well as the general public in a variety of ways:

- By communicating our results on important national and international issues to society, using multiple media outlets that span from the popular press to professional scientific journals;
- By encouraging new and diverse scientific talent by supporting programs for grades K-12, undergraduate, and graduate students;
- By ensuring that our successes are publicized rapidly and widely;
- By positioning ourselves as the source for answers and expertise on environmental issues.

In addition to its international partnerships, our Educational and Partnership Program with Minority Serving Institutions (EPP/MSI) consists of four competitive programs: the Cooperative Science Centers; the Environmental Entrepreneurship Program; the Graduate Sciences Program; and the Undergraduate Scholarship Program. Working through EPP/MSI, we advance education via collaborative state-of-the-art research, faculty/staff exchanges, curriculum development, and enhancement (i.e., traditional and non-traditional courses). NOAA and partnering academic institutions benefit from these collaborative activities in three areas: increased trained human resources, technical proficiency, and cutting edge technology.

II. OAR Contributions to NOAA Goals and Strategies

The NOAA Strategic Plan describes our agency's guiding principles and approach to management and outlines our goals, outcomes, and strategies associated with the research that is planned for the next six years and beyond. While the research focus in OAR's many laboratories and programs such as NURP and SG is very broad, it is targeted to meet the mission needs of a range of NOAA programs.

Four external "Mission Goals" provide the context for NOAA programs and the plans for those programs. An internal Mission Goal that addresses the agency's ability to meet its four external Mission Goals is also described in NOAA's Strategic Plan. NOAA's Mission Goals supported by us and described in this document are:

- Protect, Restore, and Manage the Use of Coastal and Ocean Resources through an Ecosystem Approach to Management
- Understand Climate Variability and Change to Enhance Society's Ability to Plan and Respond
- Serve Society's Needs for Weather and Water Information
- Provide Critical Support for NOAA's Mission

This Plan outlines our execution of NOAA's Programs to meet NOAA's Goals, and ultimately, NOAA's Mission. Section 2 of the Plan (below) describes the NOAA "Mission Goals," introduced with a table that shows linkages among NOAA's high-level *outcomes, strategies, and programs* executed in whole or in part by OAR. The OAR Plan then describes how we will execute NOAA's Programs and provides a list of priority outcomes within each program. These *program outcomes* provide more detail about what each program hopes to achieve.

NOAA MISSION GOAL: Protect, Restore, and Manage the Use of Coastal and Ocean Resources through an Ecosystem Approach to Management

The NOAA Ecosystems Goal, as it is often called, is driven by a number of legislative mandates. This goal also aligns with the recently issued Report of the U.S. Commission on Ocean Policy, which recommends moving ocean management toward an ecosystem-based model and basing ocean policy decisions on the best available science. We assist this goal by supporting a wide variety of ecosystem-based management programs. Our laboratories and programs also participate directly in the research efforts of seven of the nine programs in the Ecosystems Goal.

Table 2.1 Ecosystem Goal Outcomes-Strategies-Programs

NOAA Outcomes <i>What do we want to achieve in six years?</i>	NOAA Strategies Employed by OAR <i>How do we manage the goal?</i>	NOAA Programs Executed Wholly or in Part by OAR
Healthy and productive coastal and marine ecosystems that benefit society A well informed public that acts as a steward of coastal and marine ecosystems	Manage uses of ecosystems by applying scientifically sound observations, assessments, and research findings to ensure the sustainable use of resources and to balance competing uses of coastal and marine ecosystems.	<i>Ecosystem Research</i>
	Improve resource management by advancing our understanding of ecosystems through better simulation and predictive models. Build and advance the capabilities of an ecological component of the NOAA global environmental observing system to monitor, assess, and predict national and regional ecosystem health, as well as to gather information consistent with established social and economic indicators.	<i>Ecosystem Observations</i>
	Develop coordinated regional and national outreach and education efforts to improve public understanding and involvement in stewardship of coastal and marine ecosystems.	<i>Aquaculture</i>
	Engage in technological and scientific exchange with our domestic and international partners to protect, restore, and manage marine resources within and beyond the Nation's borders.	<i>Habitat</i> <i>Corals*</i> <i>Coastal and Marine Resources*</i> <i>Fisheries Management*</i>

* matrix program to which OAR contributes only a small percentage of its budget; please refer to other LO Strategic Plans (NOS, NMFS) for more detail on these Ecosystem Goal programs

Ecosystem Research

The Ecosystem Research Program (ERP) is supported in large part by three laboratories and four program offices within OAR. These laboratories and programs work to provide the scientific information and tools necessary for ecosystem management to the other Goal programs and to coastal stakeholders. ERP supports and conducts research that addresses environmental concerns on all scales – local, regional, and national. In addition, ERP is responsible for the systematic exploration of the ocean environment and the development and enhancement of ocean and coastal resources. With the support of our intramural and extramural programs, ERP is ready to direct its program resources towards the highest research priorities of the Ecosystem Goal. This flexibility is vital for NOAA to be able to address emerging science issues.

We recognize our role in reaching a large number of research, education and outreach, and socioeconomic **outcomes** identified as priorities of the ERP:

- Resource managers use the best available science to make ecosystem-based decisions;
- New resources are discovered or developed
- Sufficient knowledge to develop ecosystem-based models becomes available
- Analyses of regional ecosystems and the component parts of ecosystems are available

- Resource managers benefit from the transfer of technology that ensures sustainable use of marine resources

Education and Outreach

- Understanding, acceptance and support of resource management decisions is increased;
- Research findings are integrated into education programs

Socioeconomic

- Social and economic impacts are determined
- The ability to balance social, economic, and environmental goals in ecosystem management is achieved
- Human health risks decrease as a result of improvements in the condition of coastal, marine, and Great Lakes resources

Through ERP, we work collaboratively with NOAA Marine and Aviation Operations (NMAO), NOAA Marine Fisheries Service (NMFS), and NOAA Oceans and Coasts. Universities, including Minority Serving Institutions, and state government agencies are also important ecosystem research partners.

Ecosystem Observations

NOAA's Ecosystem Observation Program (EOP) supports the programs in the Ecosystem Goal through observation and assessments of our nation's living marine resources. Our primary laboratory responsible for executing some of the program's activities is PMEL. In addition, we realize that scientific partnerships and collaborations are the key to realizing the potential of this program. Our funding for research at the Canaan Valley Institute and at the Gulf of Maine Council, for instance, supports some of the outcomes described by the EOP. These **outcomes** include:

Research and Technology Transfer

- Use & integration of new scientific developments and state-of-the-art technologies and dissemination of scientific information data and tools
- Identification and integration of NOAA's ecological observing capabilities into the Integrated Ocean Observation Program (IOOS)
- Developing data standards for comparing, evaluating and promoting NOAA's environmental monitoring programs
- Transition of monitoring and assessment results, products, and procedures into operational application
- Increased habitat characterization associated with living marine resources under NOAA's jurisdiction and increased numbers of ecosystem variables and parameters that describe the status and trends of coastal ecosystems and living marine resources
- Integrated "End to End " coastal and oceanic observing system that collect and analyze data and provide forecasts
- Collaboration with academic, industry, citizen groups, NGOs and International community partners

Education and Outreach

- Increased public awareness of ecosystem conservation and management issues and improved sense of stewardship for ecosystems

Aquaculture

Along with NMFS, NOAA Environmental Satellite Data and Information Service (NESDIS), and the National Ocean Service (NOS), we are combining our resources to

support aquaculture research and innovations for our nation. The Aquaculture Program describes its overarching goals to “develop a science and technology based regulatory framework for a well-managed and productive U.S. marine aquaculture industry. The program will support production and enhancement technology development to increase seafood production and replenish depleted species in an environmentally and economically responsible way.” **Outcomes** for the program we support include:

- Well-managed and productive marine aquaculture in the U.S.
- Worldwide adoption of environmentally sound marine aquaculture
- A fully operational regulatory infrastructure for offshore aquaculture
- Increased number of species and culturing systems for commercial and enhancement purposes
- Comprehensive understanding of marine aquaculture economics
- A well-informed public that understands NOAA's aquaculture program and has access to information on aquaculture research and industry issues

Habitat

The Habitat Program for NOAA is vital for protecting coastal, marine, and Great Lakes habitat so that future generations can enjoy their natural resources and biodiversity. Habitat science, including the study of invasive species, is a key role that we play in the Habitat Program for NOAA. Through dedicated SG and laboratory scientists in areas ranging from Alaska to the Great Lakes – we are working to answer key habitat conservation questions through sound research. Key **outcomes** we support include:

- Habitat protection, assessment, and characterization
- Habitat restoration; invasive species control
- Habitat research
- Stewardship

NOAA GOAL: Understand Climate Variability and Change to Enhance Society's Ability to Plan and Respond

The processes that drive weather, water, climate, oceans and coastal cycles are interrelated and to some extent, impacted by societal choices. Understanding these processes requires new ways of thinking. Each year, we contribute to a better understanding of the ocean's role in forcing climate variability and change, to the role of changing climate on weather phenomena, and to understanding the role humans play in all these interactions. This section of our strategic plan describes the role our scientists play in contributing to four of the five Climate Goal Programs.

Table 2.2 Climate Goal Outcomes-Strategies-Programs

NOAA Outcomes <i>What do we want to achieve in six years?</i>	NOAA Strategies Employed by OAR <i>What do we need to do to reach this goal?</i>	NOAA Programs Executed Wholly or in Part by OAR
<p>A predictive understanding of the global climate system on time scales of weeks to decades with quantified uncertainties sufficient for making informed and reasoned decisions</p> <p>Climate-sensitive sectors and the climate-literate public effectively incorporating NOAA's climate products into their plans and decisions</p>	Improve the quality of climate observations, analyses, interpretation, and archiving by maintaining a consistent climate record and by improving our ability to determine why changes are taking place.	<i>Climate Forcing</i>
	Improve the quantification and understanding of the forces bringing about climate change by examining relevant human-induced increases in atmospheric constituents.	<i>Climate Observations and Analysis</i>
	Advance sub-seasonal to inter-annual climate predictions and climate change projections by improving analysis of the climate system, using ensembles of multiple, high-end climate and Earth system models.	<i>Climate Predictions and Assessments</i>
	Develop and contribute to routine state-of-the-science assessments of the climate system for informed decision-making.	<i>Regional Decision Support</i>
	Work with customers in order to deliver climate services and information products involving in health, safety, environmental, economic, and community planning that increase the effective application of this information.	
	Coordinate among NOAA Line Offices the transition from investigator-driven research projects to operational facilities, capabilities, and products.	

Climate Observation and Analysis

Nine of our laboratories or programs, including the OGP, contribute to the Climate Observation and Analysis Program. We invest resources in this program because climate observations are the foundation for research critical to understanding earth's climate system, improving climate predictions, and monitoring current climate. Quality data stewardship is a high priority for this program. Research, business, and government users utilize archived data records to conduct economic and environmental forecasts and timely analyses and assessments of present and past climate. These activities are essential to determining policies and plans that will impact the nation's economy, environment, and society.

Priority **outcomes** of the Climate Observations and Analysis Program we support are:

- Easy and convenient access by NOAA's customers to new and historical national and global observations and climate analyses
- Improved climate forecast skill, better constrained estimates of climate model uncertainties, and increased credibility of climate change projections
- Increased use of climate information by policy makers and resource managers from government and the private sector

Climate Predictions and Projections

The Climate Predictions and Projections Program will provide the nation with a seamless suite of forecasts (e.g. outlooks and projections) on intraseasonal, seasonal, interannual, and multi-decadal timescales. Decision-makers will use these forecasts to manage risks and opportunities of climate variability and change and associated environmental impacts. Four of our laboratories and one program office support these **outcomes** described as priorities of the Climate Predictions and Projections Program:

- Improved intraseasonal and interannual climate forecasts
- Regional and national managers enabled to plan better for the impacts of climate variability and change
- Predicted consequences of climate variability and change on human and natural systems
- Strategic partnerships and collaborations between us and NOAA's National Weather Service (NWS), our JI's, and academia are important to the success of this program.

Climate Forcing

Five of our laboratories and the OGP are responsible for achieving the following **outcomes** of the Climate Forcing Program:

- A timely understanding of atmospheric and oceanic carbon dioxide trends and oceanic and terrestrial carbon emission and uptake processes
- Timely information on the climate roles of the radiatively important fine-particle aerosols
- Timely information on radiative forcing by non-CO₂ greenhouse gases with special emphasis on short-lived tropospheric ozone
- Verification of the recovery of the ozone layer and the decline of ozone-depleting chemicals in the atmosphere
- Quantify the climate sensitivity due to water vapor

Strategic partnerships -- within and outside NOAA -- for our staff supporting the Climate Forcing Program include NMAO and NESDIS. These line offices participate in the Climate Forcing Program as part of the Climate Goal Team. Other partners include the National Aeronautics and Space Administration, the Department of Energy, the Climate Change Science Program Office (CCSPO), and academic institutions and OAR JI's such as the Cooperative Institute for Research in Environmental Sciences (CIRES).

Regional Decision Support

The Regional Decision Support Program helps NOAA identify and serve the nation's needs for climate information to support decision making through an integrated program of: research on decision maker needs, transitioning the results, and operationally producing and delivering local and regional climate services. We actively participate in the research and research transition aspects of the program. One of our laboratories, the OGP, several JI's, as well as partners in academia, NWS, and NESDIS contribute to the Regional Decision Support Program. Our **outcomes** include:

- The Nation's principal climate sensitive resource challenges and opportunities identified
- The climate-sensitive public is aware of NOAA's climate products and effectively using them in its routine activities
- Regional, state and local decision makers have access to the climate information, products, and customer services

NOAA GOAL: Serve Society's Needs for Weather and Water Information

We play an important role in sustaining, improving, and expanding information, products, and services for NWS and for the Nation. Our weather and water research contributes to improvements in tornado warning lead times, false alarm rates, hurricane intensity and track forecasts, geomagnetic storm forecasts, flash flood forecasts, day-1 precipitation forecasts, and the Automatic Weather Interactive Prediction System (AWIPS). NOAA air quality research plays a key role in improving air quality forecasting capabilities, provides essential information about drivers of air pollution to air quality decision makers (e.g., federal and state policy-makers), and monitors long-term trends of air pollution and atmospheric deposition. NOAA weather and water research also serves NOAA in the area of education and outreach to the public; our weather and climate information, products, and services serve to educate and inform America's forecasters and users of weather information.

Table 2.3 Weather and Water Goal Outcomes-Strategies-Programs

NOAA Outcomes <i>What do we want to achieve in six years?</i>	NOAA Strategies Employed by OAR <i>What do we need to do to reach this goal?</i>	NOAA Programs Executed Wholly or in Part by OAR
Reduced loss of life, injury, and damage to the economy	Improve the reliability, lead-time, and understanding of weather and water information and services that predict changes in environmental conditions.	<i>Science, Technology, and Infusion Program</i> <i>Air Quality</i> <i>Coasts, Estuaries, and Oceans</i> <i>Environmental Modeling</i> <i>Space Weather</i>
Better, quicker, and more trusted weather and water information to support improved decisions	Integrate an information enterprise that incorporates all stages from research to delivery, seeks better coordination of employee skills and training, and engages customers.	
	Develop and infuse research results and new technologies more efficiently to improve products and services, to streamline dissemination, and to communicate vital information more effectively.	
Increased satisfaction with quality of weather and water information and services	Work with private industry, universities, and national and international agencies to create and leverage partnerships that foster more effective information services.	
	Build a broad-based and coordinated education and outreach program by engaging individuals in continuous learning toward a greater understanding of the impacts of weather and water on their lives.	
	Employ scientific and emerging technological capabilities to advance decision support services and to educate stakeholders.	

Science, Technology and Infusion

The majority of the NOAA weather and water research capabilities reside in Science, Technology and Infusion Program (ST&I). The Science, Technology and Infusion Program works to sustain, improve, and expand NOAA's weather and water information, products, and services by meeting short-term needs of its customers. At the same time, we conduct mission-focused long-term research that leads to breakthrough advances. ST&I conducts research and development in concert with the NOAA's operation and implementation programs to infuse new science and technology via prototyping, evaluation, acquisition and training. Our top three priorities are: 1) research and development in water resources; 2) research, development, and acquisition in information technology and research; and 3) development in integrated observing systems. The expected **outcomes** for our ST&I Program are:

- Improving flash flood forecast accuracy via 0-1 hour precipitation rate in defined aerial space research

- Improving day-1 precipitation forecast accuracy via an hydrometeorologic test-bed
- Improving tornado warning lead-time accuracy via multiple radar data assimilation and storm scale numerical model research, and establish phased array radar baseline for space in time resolution compare against 88-D
- Prototyping hurricane intensity forecasts via evaluate and improve Statistical Hurricane Intensity Prediction System (SHIPS)
- Doubling the hurricane intensity forecast skill via developing data assimilation, improving spatial resolution to 1 km and refining physical processes for hurricane- Weather Research Forecasting model (WRF)
- Sustaining and improving AWIPS capability via improved computation infrastructure, security and interfacing meso-scale models to provide warn-on-forecasts
- Enhancing environmental literacy with NOAA information, products and services via Science-on-Sphere enabling the Nation to respond to environmental changes
- Improving weather and water observing system via advancement of atmospheric observing systems (e.g. Global Positioning System (GPS) wind-profiler and unmanned aerial vehicle)

Air Quality

NOAA air quality research is a major and unique resource in the national effort to ensure that the public has clear air to breathe. In the often-contentious field of air quality management, NOAA acts as an “honest broker,” providing new insights into atmospheric physical and chemical processes and providing potential solutions for air quality decision-makers. In addition, NOAA has launched an operational air quality forecasting system that provides daily forecast guidance for major pollutants of concern to state and local air quality forecasts and to the public. We are developing advanced capabilities, such as models describing particulate matter formation and distribution, for the forecasting system. We also contribute to nationwide monitoring of long-term trends of air pollution and the deposition of pollutants to ecosystems. The desired long-term **outcomes** for our support of the Air Quality Program are:

- Air quality decision-makers nationwide can make effective and efficient plans
- Society can respond effectively and efficiently to anticipated unhealthful air quality conditions

Coasts, Estuaries, and Oceans

The NOAA Coasts, Estuaries, and Oceans Program (CEO) supports NOAA’s Strategic Plan Goal to serve society’s needs for Weather and Water information outcomes by providing improved and comprehensive national coastal water condition information and services and enabling environmental managers, decision makers, and the public to make better decisions regarding health and safety, and natural, economic, and ecological resources. We contribute to the CEO’s goals through the environmental light detection and ranging (LiDAR) research capacity. Our environmental LiDAR research focuses on integrating airborne LiDAR measurements of environmental and ecosystem parameters to support the following CEO **outcome**:

- Develop and operationalize additional forecast tools and decision support via the National Water Conditions Forecast

Environmental Modeling

The Environmental Modeling Program (EMP) is one of the primary enabling programs for the provision of NOAA's products and services to the nation. It provides models and model-based estimates of both the current and future states of the environment. We support the NOAA EMP, WRF, and hurricane model. The desired EMP **outcomes** include:

- Meeting model-based guidance needs for all of NOAA's research, information, product and service programs
- Providing accurate and useful estimates in the current state of the science
- Meeting operational requirements for timely and reliable delivery of model-based guidance to NOAA's research, information, product and service programs
- Developing observing data collection requirements for the integrated NOAA observing system to tailor the needs of NOAA's integrated environmental modeling system

Space Weather

The OAR Space Environment Center (SEC) plays a key role in the Space Weather Program at NOAA. The SEC collaborates with other parts of NOAA and with agencies such as NASA and the Department of Defense to improve and maintain capabilities for space weather forecasting and warnings. These forecasts serve the public's needs for improved information about space weather events. Our Space Weather Program desired **outcomes** are:

- Improved public safety and social and economic benefits from application of space weather information and services
- Public is knowledgeable about space weather and its impacts on their lives and is capable of making informed decisions
- Customers are satisfied with NOAA's space weather information and services
- Informed social and policy decisions in the areas affected by space weather
- Airlines plan their schedules and routes based on space weather information to maximize the efficiency of their operations
- Enhanced safety of aircraft passengers and crew from a reduced risk to the hazards of space weather
- Improved reliability and accuracy in navigation and positioning systems
- Operators of commercial, civilian and defense satellite systems modify operations to minimize impacts of space weather
- Space commerce systems engineered better to optimize their return on investment
- On orbit operations for astronauts are modified to minimize effects of space weather
- Electrical power infrastructure operated more efficiently and reliably by utilizing space weather information in their operations
- Users able to take steps necessary to mitigate effects of space weather on HF communications
- Integrated cooperation between Federal, State and Local government agencies using space weather information and services
- Electric power industry uses regional specifications of geomagnetic activity to adjust system loading and power transfers
- Navigation and positioning systems use new regional ionospheric specifications to improve accuracy

Provide Critical Support for NOAA's Mission

We recognize that excellence in leadership and management is vital in supporting the three Mission Goals previously described in this plan. The Mission Support Goal for NOAA outlines the management, human capital, and infrastructure functions of the line offices. Line offices, responsible for executing NOAA's programs, understand that program outcomes will only be achieved through effective and efficient management of our business practices, of our partnerships within and outside of the agency, and of our human capital.

Sustaining a superior research organization requires an increase in our long-term commitment to maintain and improve the recruitment of superb and diverse scientific talent, the agency's financial health, streamlined management processes, and state-of-art information technology (IT). We are committed to building a strong and diverse workforce, to offering professional growth opportunities, and to ensuring a high quality work life that includes options such as telework and e-learning. We also recognize that our cooperation and collaboration with offices managing NOAA ships, aircrafts, and satellites is extremely important for advancing scientific knowledge into the future. In addition, we will improve IT security to ensure data integrity, take full advantage of advancing web and telecommunications, and utilize supercomputing technology to support world-class research.

We provide research, development, and expertise in weather, climate, hydrologic, marine science, solar, and related environmental sciences issues for the United States, its territories, adjacent coastal waters, and to those same areas of cooperating governments, through international agreements. Our scientists will provide models and forecasts in the event of the release of dangerous particles into the atmosphere or disruptive solar events to support homeland security. We will collect and disseminate specialized meteorological and air quality data and provide expert guidance about air dispersion, marine currents, waves, acoustics, and chemical and biological composition and deposition. OAR scientists are also ready to provide research and expertise to support public agencies responding to homeland security incidents, including the interpretation of scientific information in support of emergency response operations.

III. The Way Forward

From the bottom of the ocean to the surface of the sun . . .

We will contribute to *"a society that uses the results of our research as the scientific basis for more productive and harmonious relationships between humans and the environment."* We are working with our partners to support customers and users of NOAA information and services and to ensure that our science and technology is robust and visionary. To better serve our customers we will bridge the gap between research and operations so that our products and services are based on the latest and most innovative science available. We will identify emerging issues and problems; develop linkages between data collection, monitoring systems, and research; and provide end-to-end user support for our products and information services. All of our customers – internal and external to the agency – will ultimately benefit from advances in our research management capabilities.

A key component of the NOAA Strategic Plan is to “engage, advise, and inform,” and to work with stakeholders, policy makers, and resource managers to identify pressing public policy concerns and to respond with relevant research agendas. Our nation’s insurance against threats to our economy and environment is research relevant at the human scale, improved predictions of environmental phenomena, and continued explorations of poorly understood systems. We recognize these challenges of research and will continue to “move NOAA into the 21st century scientifically and operationally” in accordance with the NOAA and OAR Missions.

Appendices

Appendix A1: Evaluating our Performance

We set priorities based on current agency demands, as well as on the anticipated and increasingly more complex societal and environmental needs. Dedication to research activities is essential for answering these complex and interrelated scientific questions and for meeting the goals identified in the NOAA Strategic Plan.

The ultimate test of our success is whether our research is ultimately making a difference to the American people and contributing to the improvement of our global environment. We will continually welcome input from our customers and employees to ensure that our priorities evolve to meet society’s needs and that our products and services provide value to our customers. Opportunities to engage NOAA staff with our customers can help us to gauge the effectiveness of our products and services and to recognize the achievement of outcomes highlighted throughout this document.

Table 3.1 NOAA’s Corporate Performance Measures Executed by OAR

**** We will highlight the PMs in the table that we execute and attach it here or in the appendix – still in progress****

Appendix A2: Organizational Abbreviations

AL	Aeronomy Laboratory
ARL	Air Resources Laboratory
ARO	Arctic Research Office
AOML	Atlantic Oceanographic and Meteorological Laboratory
AWIPS	Automatic Weather Interactive Prediction System
CCSPO	Climate Change Science Program Office
CDC	Climate Diagnostics Center

CEO	Coasts, Estuaries, and Oceans Program
CIO	Chief Information Officer
CIRES	Cooperative Institute for Research in Environmental Sciences
CMDL	Climate Monitoring and Diagnostics Laboratory
COSP	Climate Observations and Services Program
EOP	Ecosystem Observation Program
ETL	Environmental Technology Laboratory
FSL	Forecast Systems Laboratory
GFDL	Geophysical Fluid Dynamics Laboratory
GLERL	Great Lakes Environmental Research Laboratory
GPS	Global Positioning System
IOOS	Integrated Ocean Observation Program
JI	Joint Institutes
NESDIS	National Environmental Satellite Data and Information Service
NGO	Non-Governmental Organizations
NMAO	NOAA Marine and Aviation Operations
NMFS	National Marine Fisheries Service
NOS	National Ocean Service
NSSL	National Severe Storms Laboratory
NURP	National Undersea Research Program
NWS	National Weather Service
OAR	Office of Oceanic and Atmospheric Research
OE	Office of Ocean Exploration

OGP	Office of Global Programs
PMEL	Pacific Marine Environmental Laboratory
SEC	Space Environment Center
SG	National Sea Grant College Program
SHIPS	Statistical Hurricane Intensity Prediction System
ST&I	Science, Technology, and Infusion Program
W&AQ	Weather and Air Quality
WRF	Weather Research Forecasting Model